AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (previously presented) A manufacturing method of a semiconductor device, which comprises depositing a metal film made of an aluminum alloy over a semiconductor substrate, and etching the metal film with a plasma of a mixture gas containing a Cl_2 gas, a BCl_3 gas and a CH_2Cl_2 gas.

2. (previously presented) The method of Claim 1, wherein the pressure of the mixture gas is 0.6 Pa or greater, but not greater than 1.5 Pa.

3. (previously presented) The method of Claim 1, wherein the CH_2Cl_2 gas has a purity of 99.99% or greater.

4. (previously presented) The method of Claim 1, wherein the plasma is generated using an electromagnetic wave within a frequency range of 300 MHz to 1 GHz.

5. (previously presented) The manufacturing method of a semiconductor device, which comprises forming a multilayer interconnection of metals including aluminum over a semiconductor substrate, wherein, for etching of the metal multilayer interconnection, a plasma of a mixture gas containing a Cl_2 gas, a BCl_3 gas and a CH_2Cl_2 gas is used.

6. (previously presented) The method of Claim 5, wherein the pressure of the mixture gas is 0.6 Pa or greater, but not greater than 1.5 Pa.

7. (previously presented) The method of Claim 5, wherein the CH_2Cl_2 gas has a purity of 99.99% or greater.

8. (previously presented) The method of Claim 5, wherein the plasma is generated using an electromagnetic wave within a frequency range of 300 MHz to 1 GHz.

9. (previously presented) The manufacturing method of a semiconductor device, which comprises forming metal films by stacking a first TiN film, an Al film and a second TiN film successively over a semiconductor substrate, and etching said first TiN film, said Al film and second TiN

film with a plasma of a mixture gas of a Cl_2 gas, a BCl_3 gas and a CH_2Cl_2 additive gas, wherein the CH_2Cl_2 gas is added in an amount of 0 to 4% for etching of the second TiN film, and the amount of the CH_2Cl_2 gas is increased to 5 to 30% during etching of the Al film.

10. (previously presented) The manufacturing method of a semiconductor device, which comprises depositing a metal film made of an aluminum alloy over a semiconductor substrate, forming a resist mask over the metal film, etching the metal film with a plasma of a mixture gas of a Cl_2 gas, a BCl_3 gas and a CH_2Cl_2 gas, and removing the resist mask with a plasma of a mixture gas containing an F element and an O element.

11. (previously presented) The manufacturing method of a semiconductor device, which comprises depositing a metal film made of an aluminum alloy over a semiconductor substrate, forming patterns at a wiring pitch less than 500 nm over the metal film, and etching the metal film with a plasma of a mixture gas containing a Cl_2 gas, a BCl_3 gas and a CH_2Cl_2 gas.

12. (previously presented) The manufacturing method of a semiconductor device, which comprises depositing a metal film made of an aluminum alloy over a semiconductor substrate, forming, over the metal film, first mask patterns at a first wiring pitch and second mask patterns at a second wiring pitch wider than the first wiring pitch, and etching the metal film with a plasma of a mixture gas containing a Cl_2 gas, a BCl_3 gas and a CH_2Cl_2 gas.

13. (previously presented) The manufacturing method of a semiconductor device, which comprises depositing a metal film made of an aluminum alloy over a semiconductor substrate, forming, over the metal film, first patterns at a first wiring pitch and second patterns at a second wiring pitch wider than the first wiring pitch, and etching the metal film with a plasma of a mixture gas containing a Cl_2 gas, a BCl_3 gas and a CH_2Cl_2 gas.

14. (currently amended) The manufacturing method of a semiconductor device, which comprises forming metal films over a semiconductor substrate by stacking a first TiN film, an Al film and a second TiN film one after another, and etching said first TiN film, said Al film, and second

TiN film with a plasma of a mixture gas containing a Cl_2 gas, a BCl_3 gas and an additive gas obtained by diluting a CH_2Cl_2 gas with a dilution gas, wherein the mole concentration of the CH_2Cl_2 gas in said additive gas after dilution with the dilution gas is 10% to 100%.

15. (previously presented) The manufacturing method of a semiconductor device, which comprises depositing a metal film made of an aluminum alloy over a semiconductor substrate, and etching the metal film with a plasma formed, in a plasma etching system for generating a plasma by using an UHF-range electromagnetic wave, from a mixture gas containing a Cl_2 gas, a BCl_3 gas and a CH_2Cl_2 gas.

16. (new) A method of making a patterned metal layer on a substrate comprising:

providing a layer of a metal including an aluminum alloy on a substrate;

forming a mask layer on said layer of metal, said mask layer leaving a portion of said metal layer exposed;

etching said exposed portion of said metal layer with a plasma of a gas mixture containing Cl_2 gas, BCl_3 gas and an added shape controlling gas containing a chlorinated

hydrocarbon gas, wherein said chlorinated hydrocarbon gas is CH_2Cl_2.

17. (new) The method of Claim 16, wherein said substrate is a semiconductor subtrate.

18. (new) The method of Claim 16, wherein said metal film comprises at least one layer of TiN and at least one layer of an aluminum alloy.

19. (new) The method of Claim 18, wherein said etching includes a first etching step in which said TiN layer is etched and said additive shape-controlling gas includes from 0 % to 4 % of said CH_2Cl_2 gas, based on said Cl_2 gas, and a second etching step in which said aluminum alloy layer is etched and said additive shape controlling gas includes from 5 % to 30 % of said CH_2Cl_2 gas, based on said Cl_2 gas.

20. (new) The method of Claim 16, wherein said metal film is covered with a patterned resist and, after said etching, said patterned resist is removed by exposure to a

plasma including a fluorine-containing gas and an oxygen-containing gas.

21. (new) The method of Claim 20, wherein said fluorine-containing gas is CF_4 and said oxygen-containing gas is O_2.

22. (new) The method of Claim 20, wherein said patterned resist includes a wiring pattern having a wiring pitch of less than 500 nm.

23. (new) The method of Claim 20, wherein said patterned resist includes a wiring pattern having a wiring pitch of 300 nm or less.

24. (new) The method of Claim 20, wherein said patterned resist includes a wiring pattern having a wiring pitch of 260 nm or less.

25. (new) The method of Claim 20, wherein said patterned resist includes a wiring pattern having a wiring pitch of 200 nm.

26. (new) The method of Claim 20, wherein said patterned resist includes a first wiring pattern having a first wiring pitch and a second wiring pattern having a second wiring pitch smaller than said first wiring pitch.

27. (new) The method of Claim 16, wherein said additive shape-controlling gas contains from zero mole percent to 90 mole percent of an inert dilution gas.

28. (new) The method of Claim 27, wherein said inert dilution gas is Ar gas.

29. (new) The method of Claim 16, wherein said gas mixture has a pressure of 0.6 Pa to 1.5 Pa.

30. (new) The method of Claim 16, wherein said CH_2Cl_2 gas has a purity of at least 99.99 %.

31. (new) The method of Claim 16, wherein said plasma is generated using an electromagnetic field having a frequency range of from 300 MHz to 1 GHz.

32. (new) The method of Claim 16 additionally incorporating a step of removing a sidewall protective film generated by said etching step by washing said etched metal layer.

33. (new) The method of Claim 32 wherein said etched metal layer is washed with a solution of acetic acid and aqueous ammonia.

34. (new) A method of etching a wiring pattern in a metal layer including an aluminum alloy supported on a substrate comprising:

providing a metal layer containing an aluminum alloy supported on a substrate and having a patterned resist layer supported thereon, and

etching the metal layer with a plasma of a gas mixture containing Cl_2 gas, BCl_3 gas and an added shape-controlling gas comprising CH_2Cl_2.

35. (new) The method of Claim 34, wherein said substrate is a semiconductor subtrate.

36. (new) The method of Claim 34, wherein said metal film comprises at least one layer of TiN and at least one layer of an aluminum alloy.

37. (new) The method of Claim 36, wherein said etching includes a first etching step in which said TiN layer is etched and said additive shape-controlling gas includes from 0 % to 4 % of said CH_2Cl_2 gas, based on said Cl_2 gas, and a second etching step in which said aluminum alloy layer is etched, and said additive shape controlling gas includes from 5 % to 30 % of said CH_2Cl_2 gas, based on said Cl_2 gas.

38. (new) The method of Claim 34, wherein said additive shape-controlling gas contains from zero mole percent to 90 mole percent of an inert dilution gas.

39. (new) The method of Claim 38, wherein said inert dilution gas is Ar gas.

40. (new) The method of Claim 34 additionally incorporating a step of removing a sidewall protective film

generated by said etching step by washing said etched metal layer.

41. (new) The method of Claim 40 wherein said etched metal layer is washed with a solution of acetic acid and aqueous ammonia.